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CANOPY RESEARCH METHODS: A REVIEW

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Forest canopies were long considered to be relatively inaccessible and therefore much neglected as targets for research. The great diversity of organisms there and the complexity of interactions among species were suspected but not fully documented. Now, thanks to the development of a variety of techniques permitting reaching and moving within canopies, investigation of this biologically rich area has begun to flourish.

Indirect access from the ground can be achieved by the use of firearms to shoot down specimens of leaves, fruits or flowers, or by long-handled remotely operated pruning clippers. Foot irons and straps used by lumbermen can be used for climbing individual trees for purposes of observation and sampling near the trunk. Ladders, either episodically placed or permanently fixed at a site, give access to near-trunk areas. The application of mountain-climbing and abseiling apparatus to tree-climbing has permitted more flexibility and greater independence from the immediate vicinity of the bole and has improved safety and comfort. Retention of permanent ropes in place allows for repeatability of sampling. Towers into the canopy have given independence from tree boles but limit the observer to a fixed site.

Ranging further afield is permitted by construction of walkways through the canopy. These have varied from simple boardwalks supported by cables to elaborate suspended bridges complete with hand rails. These permit long-term repeated sampling or sustained observation from fixed aerial pathways. They also give access to more than one tree within short intervals of time and thus allow one to see the forest as well as the trees. Vertical transects can be achieved by using rope techniques to descend from walkways. Cable cars provide the same type of access, i.e., along fixed paths and with the option of vertical descent at any one point. In this case, the cable car is the vehicle of vertical as well as horizontal movement. Both have the disadvantage of limiting the observer to a particular area of the forest.

Cranes with a cable car for descent can reach a rather large area of forest. (This technique is described in detail in another article in this issue.) Greater mobility is achieved by use of portable scaffolds that can be assembled wherever needed. They are most effective at the edges of forest and cannot be used to reach all kinds of canopies. Similar mobility can be obtained through the use of trailer-mounted hydraulic lifts or "cherry pickers" pulled by four-wheel drive vehicles. This technique is limited by terrain and presence of access roads, but gives excellent horizontal and vertical access and allows sampling from a number of trees at one site. Tall canopies may be out of reach.

Perhaps the most innovative technique currently available is the use of hot-air blimps to lower inflatable platforms onto forest canopies. The platforms enclose net centers that permit moving across the canopy and sampling even peripheral portions of trees. The platform could be used as a point of descent to lower levels as well.